Statement of
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before the
Subcommittee on Conventional Forces and Alliance Defense
and the
Subcommittee on Defense Industry and Technology
Committee on Armed Services
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Mr. Chairman, I am pleased to be here today to testify for the Congressional Budget Office (CBO) on the pace of weapons production for the Department of Defense (DoD). My testimony presents preliminary results of a study being done at the request of the present Committee Chairman.

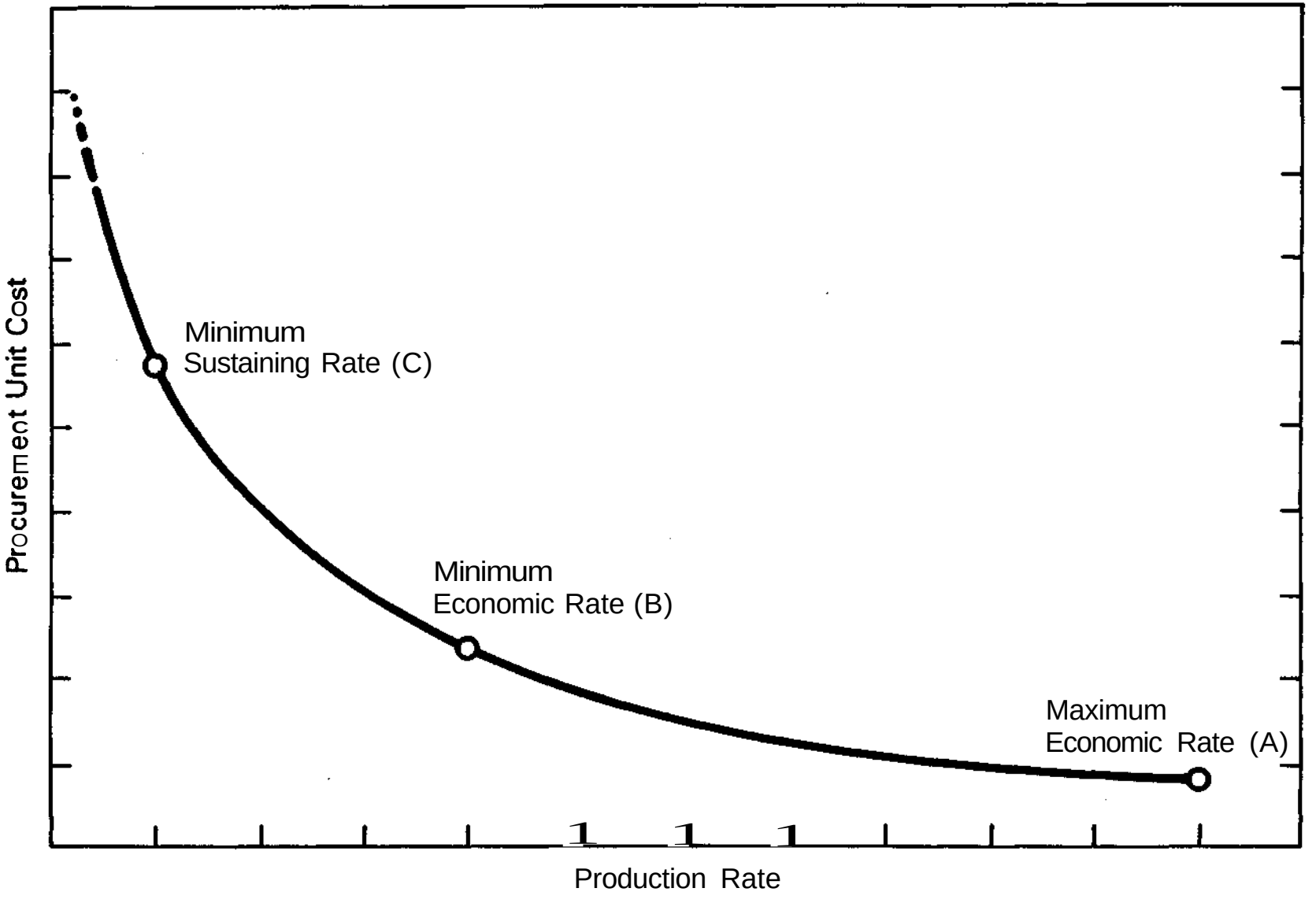
Many DoD weapons are currently being procured at rates well below maximum. Higher production rates would offer important advantages: more weapons would get into the field more quickly, and unit and total program costs would be lower. But higher production rates also have some potential disadvantages. Key among them are higher near-term program costs. These costs would probably require offsetting budget reductions, including perhaps the deferral for a few years of new weapons systems with accompanying delays in the benefits of their new technology. Thus, the choice of how fast to produce DoD weapons involves trade-offs. My testimony will illustrate the nature of these trade-offs--quantifying them where possible.

PRODUCTION RATES IN RECENT YEARS

What constitutes a low rate of production? DoD defines three rates of production:

- The maximum economic rate (point A in attached Figure) is

DEFINITIONS OF ECONOMIC PRODUCTION RATES



defined as the highest rate of production permitted by existing (or planned) plant capacity, tooling, or test equipment.

- The minimum economic rate (point B) is the lowest production rate that still offers an acceptable rate of return on the investment made by the contractor and the government; it is usually not the point with lowest unit cost, however, since unit costs generally decline until the maximum rate is reached.
- The minimum sustaining rate (point C) is the lowest production rate that can maintain an active production base and is often associated with the minimum production using one shift of workers five days a week, eight hours per day.

Attaching specific rates to each of these definitions involves considerable judgment, particularly for the minimum economic rate. (Indeed, DoD has decided not to require the reporting of minimum economic rates in the future.) CBO has used the judgments of the services about these rates in its analysis of past procurement trends.

For 40 major weapons systems, CBO compared actual production in 1983 to 1987 with these three target rates. There were indeed cases where production was undertaken at or above DoD's definition of minimum economic rates. Nineteen of the 40 systems (48 percent) had average rates of production that met or exceeded their minimum economic rate over the five years. Most of these systems are listed first in Table 1 and include such

TABLE 1. PRODUCTION RATES OF SELECTED WEAPONS, ACTUAL AND TARGET

	1983-1987 Annual Procurement Rates			Minimum Sustaining Rate	Minimum Economic Rate	Maximum Economic Rate
	Minimum a/	Maximum	Average a/ b/			
Systems Bought at Higher Than Minimum Economic Kate						
AH-64 Apache Helicopter	112	138	117	24	72	144
Ml Abrams Tank	790	855	825	360	720	1,080
M2 Bradley Fighting Vehicle	600	716	647	336	540	792
Patriot Missile	287	700	485	240	240	840
Stinger Missile	1,956	6,250	3,539	1,200	1,800	11,520
F/A-18 Aircraft	84	84	84	36	84	145
Standard Missile 2 c/	1,150	1,384	1,238	N/A	840	1,324
Sparrow Missile d/	1,700	2,445	2,015	600	1,200	3,804
B-1B Bomber	10	48	31	12	24	48
C-5B Transport	8	21	15	4	4	24
F-16 Aircraft	120	180	155	72	108	324
Hellfire Missile d/	4,870	7,304	6,131	1,200	1,500	6,720
Multiple Launch Rocket System	21,821	72,000	49,905	24,000	36,000	72,000
F-14A Aircraft	15	24	21	12	12	96
KC-10 Tanker/Cargo Aircraft	8	12	9	8	8	24
Systems Bought Below Minimum Economic Rate						
AV-8B Aircraft	21	46	34	30	36	72
A-6E Aircraft	6	11	8	6	12	72
F-15 Aircraft	36	48	41	48	120	144
Ground Launched Cruise Missile	76	120	99	120	120	600
Harpoon Missile	96	354	267	180	360	660
MX Missile	12	21	17	12	21	48
P-3C Aircraft	5	9	8	6	16	24
Phoenix Missile	108	265	222	108	240	420
SH-60B Lamps Helicopter	17	27	21	21	60	60
Tomahawk Missile	51	315	184	120	300	540

SOURCE: Compiled by the Congressional Budget Office from Department of Defense, Procurement Summary (P-1), various years.

a. Excludes initial two years of production.
b. Average over years within the period 1983-1987 when the system was actually procured.
c. Combined procurement of medium-range and extended-range versions.
d. Combined procurement of all services.

programs as the Ml tank, Bradley Fighting Vehicle, Apache helicopter, F/A-18 aircraft, Sparrow missile, B-1B bomber, C-5B transport, and the F-16 aircraft. Fifteen of these 19 systems were bought at or above their minimum economic rate in every year of the 1983-1987 period. (Since it normally takes some time for a production program to reach its economical rate, CBO overlooked low rates in the first two years of production in this and subsequent assessments.)

On the other hand, only four of the 40 systems ever reached their reported maximum economic production rate and then for only a few of the five years examined. Indeed, for the systems shown in Table 1, production averaged only about 50 percent of the maximum rate.

Moreover, fully 21 systems (53 percent of the 40) reviewed by CBO were procured at average rates below their minimum economic rate, and 9 of these 21 systems never achieved their minimum economic rate in any year during the 1983 to 1987 period. This number would be higher except that minimum economic rates reported by the services are sometimes very low. For example, the Navy reported that the minimum economic rate for three aircraft--the E-2C Hawkeye, EA-6B Prowler, and SH-2F Seasprite--is only six per year.

Finally, procurement rates for certain systems sometimes fell below their minimum sustaining rate. Nine of these 40 systems were procured at levels below that rate during at least one year in the 1983 to 1987 period.

These low rates run counter to DoD policy. In 1981, DoD put forth a set of directives collectively known as the Department of Defense Acquisition Improvement Program (better known as the Carlucci Initiatives).

One of these initiatives was to achieve more economical rates of production for selected systems. Of the 40 systems CBO reviewed, 32 were on DoD's target list.

The low rates also occurred despite a relatively favorable budget climate. Over the 1983 to 1987 period, total funds appropriated for the procurement of weapons systems increased greatly compared with the preceding five-year period. In constant 1988 dollars, funds in 1983 to 1987 were 73 percent greater than those in 1978 to 1982 (for details, see Table A-1 in the appendix to my testimony). Weapons were also procured in greater numbers than in previous years, though percentage increases in numbers were often less than those in dollars. Nonetheless, rates of production were frequently quite low, suggesting that this problem will get worse if budget growth remains low or even negative.

Program managers generally planned to procure systems at higher rates, but program stretch-outs were common. For the 40 systems discussed above, CBO examined production in 1983 to 1987--first as DoD planned it in 1983, then at the levels DoD requested in each of the years, and finally at the levels actually produced (Table A-2 shows details). As DoD revised its budget each year, procurement of many systems tended to fall from planned levels. On average, DoD asked the Congress to approve production of only 88 percent of what they planned to buy as of 1983. Actual procurement averaged 84 percent of those original plans. For 24 of the 40 systems, the sum of DoD's requests fell below its plans as of 1983--and sometimes well below.

Failure to meet planned rates in some cases resulted from developmental or production problems. The AMRAAM missile, for instance, was delayed two years in development; production of several missiles was halted to resolve quality control concerns. In many other cases, budget cuts probably led to the stretch-outs.

DoD's latest budget request shows more examples of rate cuts. Of the 20 largest DoD weapons programs, 10 have requested rates in 1988 that are lower than planned as of a year ago. Four of those requested rates would put the systems below their minimum sustaining rate.

PROS AND CONS OF HIGHER PRODUCTION RATES

Should DoD produce weapons at higher rates? Certain disadvantages must be weighed against the merits of higher rates.

Disadvantages of Higher Production Rates

The most imporant disadvantage of higher production rates is the delay or cancellation of new weapons systems that would almost certainly be needed to pay for the higher rates. As I will note later, higher production rates often lower the cost per unit of a weapon. But producing 100 items rather than 50 in a particular year will almost always increase the total funding required in that year. Even if unit costs are lower, the higher numbers more than offset reduced costs per weapon. With a fixed budget, these higher

program costs would have to be offset. That could be accomplished by reducing numbers of forces or readiness, but such a proposal seems unlikely to find favor. More likely, added costs would have to be offset by canceling or deferring new weapons. This approach would delay putting those new weapons--which are almost always technologically more advanced--in the hands of U.S. fighting forces.

Higher rates have other potential disadvantages as well, though they often apply only in specific circumstances. DoD has been emphasizing the development of a second contractor for many missile programs, since experience has shown that competitive pressure often leads to lower prices. But this policy requires diverting orders from the first contractor to qualify the second source, reducing the production rate for the former just when it has the potential to shift to a high rate of production. A comparison of savings using a second source with the potential savings from higher production rates is a subject for separate analysis, but the trade-off is evident.

Higher production rates may also increase costs of modifications. Even a successful weapons system undergoes many modifications over its lifetime. It is usually cheaper to incorporate these modifications as units are produced. With high production rates, more systems may have to be recalled for modifications, a costly procedure. High production rates also limit the option to cancel a system if, for example, it became obsolete.

Finally, high rates may make it more difficult to maintain active producers. Higher production rates mean shorter production periods, if acquisitions are fixed. Shorter periods would increase the likelihood of a

production gap, because procurement of one generation of weapons might end before development of the next generation is completed. Yet, in order to facilitate transition to the next generation of weapons, it is important to keep together the accumulated knowledge and skills of engineers and key production managers. The ideal solution, of course, would be to buy existing systems quickly and efficiently and then move on to new ones. Short of this, foreign military sales might help to fill production gaps without sacrificing production efficiency.

Advantages of Higher Rates

While there are disadvantages to higher production rates, there are also compelling reasons for DoD to support them. Higher production rates mean more systems could be deployed sooner. Theater commanders emphasize that they are short of critical "war-stoppers"--modern munitions capable of blunting an enemy attack. They explicitly mention items such as the Sparrow, Sidewinder, High Speed Antiradiation Missile (HARM), Maverick, MLRS--systems for which production rates are an issue.

Higher production rates would also limit the effects of technological obsolescence that can overtake a weapon system before large numbers are in the hands of U.S. forces. Table 2 shows the number of years that would be required to meet DoD objectives for acquiring 26 selected weapons systems assuming that procurement rates planned for 1989 continue. The table also shows the number of years these systems have already been in

TABLE 2. YEARS TO ACQUIRE SELECTED MAJOR WEAPONS SYSTEMS

System	Total Program Quantity	Needed to Complete	Years in Production	Procurement Rates 1988	Procurement Rates 1989	Years to Complete a/	Total Years
AMRAAM Missile b/	24,320	24,140	1	630	1,800	14	15
AV-8B Aircraft	328	148	6	32	32	5	11
A-6E/F	345	150	18	12	18	9	27
CH/MH-53E Helicopter	153	32	11	14	14	3	14
E-2C Aircraft	141	30	18	6	6	5	23
EA-6B Aircraft	80	42	4	6	9	5	9
F-14A/D Aircraft	710	132	17	12	12	11	28
F-15A/D/E Aircraft	1,266	342	15	42	42	9	24
F-16A/B/C/D Aircraft	2,729	1,230	10	180	180	7	17
F/A-18 Aircraft	1,157	580	9	84	72	8	17
HARM Missile b/	14,619	7,098	7	2,514	2,659	3	10
Harpoon Missile	3,971	886	13	124	138	7	20
Hellfire Missile c/	48,696	27,614	6	5,000	4,000	7	13
IIR Maverick Missile d/	60,664	50,744	6	2,100	1,900	27	33
Ml Tank	7,844	2,086	9	600	534	4	13
M2 Fighting Vehicle	6,882	2,549	8	616	618	4	12
Multiple Launch Rocket System	440,322	180,000	8	72,000	36,000	4	12
MX Missile	223	157	4	21	21	8	12
Patriot Missile	6,452	3,602	8	715	815	5	13
Phoenix Missile	7,204	5,904	8	430	560	11	19
SH-60F Aircraft	175	168	1	18	18	10	11
Standard Missile 2	14,677	9,375	12	1,150	1,635	6	18
Stinger Missile c/	50,370	31,631	10	4,200	5,000	7	17
Tomahawk Missile	3,994	2,958	8	475	510	6	14
TOW 2 Missile c/	125,856	48,623	7	9,416	8,719	6	13
UH-60 Helicopter c/	1,111	252	11	61	72	4	15

SOURCE: Computed by the Congressional Budget Office based on DoD data contained in Congressional Data Sheets, Selection Acquisition Reports, and Procurement Summary (P-1).

a. Based on 1989 rate.
b. Combined Air Force-Navy procurement.
c. Army procurement only.
d. Air Force (AGM-65D/G) version only.

production. If planned 1989 rates continue, it will have taken an average of 16 years since production began to meet DoD's objectives for acquiring these systems; for 6 of the 27 systems, it would take 20 years or more. While many of these systems have been modified during these long production periods, there are limits to what these modifications can do to meet increasing foreign threats. Completing the acquisition of these systems sooner would make room in future budgets for new weapons.

There are also good business reasons for maintaining high production rates. CBO discussed these with a number of defense contractors. They emphasized the following points:

- Once the basic investment in tooling and test equipment has been made, there are clear economies of scale in producing at higher rates.
- Program stretch-outs are disruptive. Sometimes they involve laying off trained and experienced workers. They also add to costs by forcing contractors to store long-lead items already bought. In many cases, engineering changes may make these stored items obsolete or require reworking before they can be used.
- Low production rates limit the incentive to invest in techniques to save labor and material, since it is difficult for the contractor to recover its investment.
- Low production rates discourage potential suppliers and

subcontractors from competing for defense business, thus adding to these costs.

All these points suggest that higher production rates could reduce the costs of defense systems. Let me now discuss the potential magnitude for such savings.

ANALYSIS OF EFFECT OF PRODUCTION RATE ON UNIT COSTS

CBO estimated the effects of production rates on the real (inflation-adjusted) unit costs for 13 selected missile and aircraft systems. The analysis relies on results from contractors, the military services, and CBO's own analysis of budget data. CBO found that increasing production rates by 50 percent would decrease real unit costs by from 5 percent to more than 25 percent, depending on the system. In the extreme case, according to the Air Force, unit costs for the MX missile would be reduced by 29 percent, if it were produced at the minimum economic rate of 21 missiles per year (see Table 3). Tactical missiles, such as IIR Maverick and Phoenix, offer potential savings of 12 percent to 20 percent, were production rates increased by 50 percent. Mature aircraft programs, such as the A-6 and F-14, appear to offer lower potential for cost reduction. Even for these programs, however, savings of 5 percent to 10 percent appear feasible if production rates increase by 50 percent.

Unit cost reductions result from a combination of factors. Reductions are realized by spreading fixed production costs (such as plant overhead)

TABLE 3. ESTIMATES OF THE EFFECT OF PRODUCTION RATE ON UNIT COST FOR SELECTED SYSTEMS

System	Fiscal Year 1988 Quantity Requested	Production Rate Increase: Percent Increase in Quantity	Production Rate Increase: Percent Decrease in Unit Cost	Source for Estimated Rate Effect
		Aircraft		
AH-64	67	45	5	McDonnell Douglas Helicopter Co.
A-6F	12	50	10 a/	Grumman
C-17	2	50	22	U.S. Air Force
CH/MH-53E	14	43	7	CBO
E-2C	6	50	12	Grumman
EA-6B	6	50	5	CBO
F-14D	7	50	5	CBO
F-15E	42	43	11	U.S. Air Force
KC-135R	36	44	3	U.S. Air Force
		Missiles		
AMRAAM	630	33	13	U.S. Air Force
IIR Maverick	2,100	50	12	U.S. Air Force
MX Missile	21	60	29	U.S. Air Force
Phoenix	430	50	19	Hughes

SOURCES: Congressional Budget Office; McDonnell Douglas Helicopter Company; Grumman Corporation; U.S. Air Force; Hughes Aircraft Company.

a. Estimated based on cost relationship for earlier A-6E model.

over a larger number of units. Economies result from quantity discounts on purchases of parts and components. Labor savings are achieved by assigning a larger crew of workers more specific tasks, allowing them to be more proficient, and avoiding delays associated with changing jobs. Similar savings are possible in the use of machinery, since a larger number of units can be run off more economically once a machine has been set up to perform a given task. If production rates warrant, special purpose machines may be acquired to perform tasks more efficiently than is possible with general purpose tools.

Discounting can offset the unit cost advantages of higher production rates, though usually only partially. Raising production rates involves spending more money now in order to achieve savings later. But future savings are worth less when expressed in terms comparable to near-term costs. Economists usually use the discount rate to achieve this comparability. CBO's preferred discount rate is 2 percent in real terms, which means that $1 saved today is comparable to $1.02 saved next year. At a rate of 2 percent, higher production rates still lead to savings for a number of weapons systems (see Table A-3 for examples). By direction of the Office of Management and Budget, DoD uses a real discount rate of 10 percent in cost-benefit analyses. At that rate, many fewer systems would show long-term savings if bought at higher production rates.

Even ignoring discounting, not all systems showed unit cost reductions with higher production rates. Program managers and contractors supplied CBO with a few examples (the Sparrow missile, KC-135R modification

program) that showed limited effects when production rates were increased. CBO's own statistical analysis of budget data revealed more examples. Indeed, fewer than half the systems CBO examined using budget data revealed significant rate effects, perhaps because these effects are obscured by other factors--such as system modifications and support costs.

A BUDGET ALTERNATIVE THAT ACHIEVES HIGHER PRODUCTION RATES

As my discussion suggests, there are many trade-offs involved in electing higher production rates. More weapons would be in the hands of fighting forces sooner and at lower unit costs, but near-term costs would be larger, which might require deferral of new weapons. To illustrate these effects, CBO formulated a budget alternative which assumed that, over the next five years, production rates for 12 major DoD weapons would be increased significantly. The 12 illustrative systems cover all the services and most major types of weapons; they include two aircraft, three helicopters, five missiles, and two combat vehicles. Table 4 lists the weapons and the increases considered for each.

Increasing production of these weapons would make many more of them available to U.S. forces. Compared with the Administration's plans for the next five years, this alternative would buy an additional 1,263 modern aircraft, 34,252 latest-generation missiles, and 3,109 new combat vehicles

TABLE 4. COSTS AND EFFECTS OF ACCELERATING PRODUCTION OF SELECTED WEAPONS SYSTEMS
(Costs in billions of dollars)

System	Number of Units Acquired Through 1992		Additional Units Purchased		Added Costs	
	Administration's Plan	Alternative Plan	Number	Percent	1988	1988-1992
		Aircraft				
AH-64 Apache	593	1,102	509	86	0.3	6.0
F-15E Eagle	260	392	132	51	0.5	5.1
F/A-18 Hornet	949	1,157	208	22	0.2	6.0
SH-60FCV Helicopter	85	175	90	106	a/	1.5
UH-60A Blackhawk	1,111	1,435	324	29	0.2	1.6
Total, Aircraft	2,998	4,261	1,263	42	1.2	20.2
		Missiles				
HARM	14,619	23,542	8,923	61	0.2	2.1
Harpoon	3,971	4,599	628	16	0.1	0.6
IIR Maverick	25,820	43,420	17,600	68	0.4	1.6
Standard Missile 2	3,973	4,643	670	17	a/	0.3
Stinger	43,939	50,370	6,431	15	0.1	0.3
Total, Missiles	92,322	126,574	34,252	37	0.8	4.9
		Combat Vehicles				
M1 Abrams Tank	7,844	9,718	1,874	24	a/	4.2
M2 Bradley Fighting Vehicle	6,882	8,117	1,235	18	a/	1.5
Total, Combat Vehicles	14,726	17,835	3,109	21	a/	5.7
Total Cost of All Additional Systems					2.0	30.8

SOURCE: Congressional Budget Office.

a. Less than $50 million.

(see Table 4). Many of these systems have been cited by Unified Commanders as critical items in short supply.

These faster purchases would speed attainment of service goals for modernizing and sustaining U.S. forces. The alternative plan would, for example, attain the Army's entire goal for attack helicopters by 1992 because it buys 86 percent more Apache helicopters than the Administration plans. (For purposes of determining portions and goals that are met, all weapons purchased by 1992 are assumed to have entered the inventory.) Increasing Ml purchases by 1,874 tanks would mean that 95 percent of the Ml tank objective would be met compared with 76 percent under the Administration's plan. Plans to modernize tactical aircraft forces would be substantially accelerated, often meeting objectives fully by 1992. Accelerated purchases of missiles under the alternative would improve the war reserves of these critical items as well.

The total cost of buying the weapons would also be less under this alternative than the cost of buying the same number under Administration plans. Typically, this alternative accelerates production over planned rates by between 40 percent and 100 percent. The preceding discussion of unit costs suggests that real costs could be lower by between 4 percent and 50 percent, depending on the system. (These reductions are only partially reflected in CBO's cost analysis because of difficulties of translating the unit cost reductions discussed above into long-term budget plans.)

While it is eventually cheaper to buy at high rates, more funding is required in the near term. In 1988, these higher buy rates would add $2.0

billion to the Administration's budget request. Added costs over the next five years would total $30.8 billion since rates are above Administration plans over the entire period.

In this period of fiscal restraint, these added costs would almost certainly have to be offset by other policy changes. The Congress could offset the budget impacts of higher production rates by canceling other, lower-priority systems. But it is usually hard to do this for systems being produced at full rate. It is more likely that the bill would be paid by deferring systems that are just beginning to be developed or procured. In the latest Administration budget, 15 systems have initial procurement funds either in 1988 or 1989, while 13 have initial research and development funds in those years. Deferring all these systems for two years would more than offset the added costs of accelerating production; savings would total $5.4 billion in 1988 and $32.6 billion over the next five years (see Table A-4 for details). To avoid terminating the programs that are deferred, CBO's estimates of costs assume that research and development programs are maintained at current funding levels for those systems.

Nonetheless, these deferrals would have important effects on major new systems such as the SSN-21 submarine, the C-17 aircraft, and the Army's new air defense system. Deferring production could introduce inefficiencies of its own if work had to proceed at less than an optimal pace. Moreover, by 1992, deferrals of major systems would have led to the purchase of 291 fewer aircraft, 2,724 fewer missiles, 4 fewer SSN-21 submarines, and 24 fewer landing craft. (For some deferrals, CBO cannot

determine the reduction in quantity, since procurement plans are still indefinite or classified.) Perhaps most important, deferrals would delay the planned buildup in these weapons by two years, and so would postpone the benefits of improved technology.

Thus, this illustrative example highlights a key trade-off. Maintaining higher production rates for current weapons may well delay the benefits of the newest technology for a few years. This disadvantage must be weighed against the disadvantage inherent in current plans; these plans leave today's forces with many old weapons, while waiting until budgets permit the newest weapons to be purchased in large numbers.

The trade-off, however, need not be as far-reaching as this alternative depicts. This alternative involves large numbers of deferrals coupled with large increases in production rates. The Congress could garner some of the benefits of higher rates, while also deferring fewer new systems, under a more modest approach that involves fewer systems.

CONCLUSION

In summary, Mr. Chairman, DoD often buys weapons below its target rates. Of 40 major systems examined by CBO, nine had production below minimum sustaining rates sometime in 1983 to 1987; overall production averaged about 50 percent of maximum rates. The situation continues in the 1988 budget and could grow worse if overall budget limits hold down future

defense spending. Higher production rates, however, require more near-term funds. Finding these funds would almost certainly necessitate offsetting policy changes such as the deferral of new weapons, which would delay the benefits of the newest technology for a few years. This disadvantage must be weighed against the clear advantages offered by higher production rates: they get weapons in the field more quickly, replacing old systems with reasonably modern ones, while also lowering unit costs of production.

SUPPLEMENTARY TABLES

TABLE A-1. QUANTITIES AND COSTS OF SELECTED MAJOR WEAPONS SYSTEMS
(Costs in billions of constant 1988 budget year dollars)

Systems	Fiscal Years 1978-1982	Fiscal Years 1983-1987	Increase/ Decrease (-)	Percent Change
		Aircraft		
Fixed Wing Aircraft				
Combat	2,188	2,196	8	a/
Airlift	150	248	98	65
Trainer	177	85	-92	-52
Rotary Wing Aircraft	819	1,378	559	68
Total Aircraft	3,334	3,907	573	17
Total Cost	59.9	106.0	46.1	77
		Missiles		
Strategic Theater Nuclear	1,840	2,425	585	32
Tactical				
Air-launched	24,617	68,060	43,443	176
Surface launched b/	95,564	105,816	10,252	11
Total Missiles	122,021	176,301	54,280	44
Total Cost	23.5	40.0	16.5	70
		Tracked Vehicles		
Heavy Combat Vehicles	4,324	7,358	3,034	70
Light Combat Vehicles	2,872	2,671	-201	-7
Other Vehicles	1,487	2,906	1,419	95
Total Vehicles	8,683	12,935	4,252	49
Total Cost	11.5	18.6	7.1	62
Grand Total Cost	94.9	164.6	69.7	73

SOURCE: Department of Defense Procurement Summaries.

a. Less than 0.5 percent.
b. Excludes MLRS rounds.

TABLE A-2. PLANNED AND ACTUAL PROCUREMENT RATES FOR SELECTED SYSTEMS

System	1983-1987 Budgets				
	Planned Procurement a/	Sum of DoD Requests	Percent of Plan	Quantity Approved	Percent of Plan
EA-6B Aircraft	30	42	140	44	147
P-3C Aircraft	26	38	146	38	146
Sidewinder Missile	8,318	9,827	118	10,611	128
Laser Maverick Missile	3,490	4,155	119	4,175	120
AH-64 Helicopter	435	592	138	515	118
TOW 2 Missile	67,510	95,304	141	77,412	115
E-2C Aircraft	30	30	100	34	113
F-16C/D Aircraft	720	786	109	774	108
KC-10A Aircraft	42	44	105	44	105
UH-60 Helicopter	414	414	100	426	103
Multiple Launch Rocket System	254,112	254,112	100	254,112	100
B-1 Bomber	99	99	100	99	100
C-2A Aircraft	39	41	105	39	100
C-5B Aircraft	50	53	106	50	100
EH-60A Helicopter	66	66	100	66	100
Ground Launched Cruise Missile	495	531	107	495	100
CH/MH-53E Helicopter	61	60	98	60	98
HARM Missile	7,416	8,462	114	7,274	98
Harpoon Missile	1,591	1,489	94	1,335	84
M2 Fighting Vehicle	3,897	3,496	90	3,233	83
Ml Tank	5,096	3,896	76	4,125	81
A-6E Aircraft	52	37	71	42	81
AV-8B Aircraft	216	170	79	168	78
F/A-18 Aircraft	552	456	83	420	76
SM-2 MR Missile	3,750	2,705	72	2,759	74
Sparrow Missile	13,705	9,312	68	10,099	74
F-14A Aircraft	144	105	73	105	73
Hellfire Missile	30,958	23,885	77	22,363	72

(Continued)

TABLE A-2. (Continued)

System	1983-1987 Budgets				
	Planned Procurement a/	Sum of DoD Requests	Percent of Plan	Quantity Approved	Percent of Plan
Patriot Missile	3,742	2,771	74	2,427	65
SM-2 ER Missile	2,525	1,550	61	1,480	59
SH-2F Helicopter	72	48	67	42	58
SH-60B Helicopter	186	122	66	107	58
Phoenix Missile	1,936	1,268	65	1,108	57
E-6A Aircraft	9	5	56	5	56
Tomahawk Missile	1,720	997	58	928	54
F-15D Aircraft	390	234	60	207	53
Stinger Missile	36,047	20,000	55	17,697	49
IIR Maverick Missile	35,410	18,664	53	10,334	29
MX Missile	226	145	64	66	29
AMRAAM Missile	3,639	524	14	180	5
Average			88		84

SOURCES: Department of Defense, Procurement Summary (P-1) (various years) and Congressional Data Sheets.

a. As of February 1982 Five-Year Defense Plan.

TABLE A-3. EFFECTS OF DISCOUNTING ON COSTS UNDER HIGHER PRODUCTION RATES
(Costs in millions of 1987 dollars)

System	Average Annual Production Rates		Added Costs of CBO Plan	Long-Term Savings				
	January 1986 Plan	CBO Alternative		Gross Savings	Net of Added Costs	Percent of Total Cost of CBO Alternative	Discounted Savings	
							2 Percent	10 Percent
CH/MH-53 Helicopter	14	18	160 a/	280	120	11.3	100	60
F-15E Arcraft	48	84	4,250 b/	4,860	610	4.9	330	-380
F-14D Aircraft	31	56	4,930 c/	5,630	700	5.4	260	-750
EA-6B Aircraft	12	24	730 a/	1,020	290	12.3	240	90

SOURCE: Congressional Budget Office.

a. Through 1989.
b. Through 1991.
c. Through 1994.

TABLE A-4. SAVINGS FROM DEFERRING NEW STARTS
(In billions of dollars)

Program	Savings from a Two-Year Deferral 1988	Savings from a Two-Year Deferral 1988-1992	Reduction in Units Purchased Through 1992
Research and Development Programs			
Army RDT&E Programs	0.1	2.0	n.a.
Navy RDT&E Programs	0.3	0.6	n.a.
Air Force RDT&E Programs	2.5	a/	n.a.
Procurement Programs			
Aircraft			
RC-12 Reconnaissance Aircraft	0.1	0.4	19
V-22 Osprey	0.0	4.6	106
P-3G	a/	1.6	50
EX Competition	0.2	0.7	n.a.
T-45 Trainer	0.4	1.4	96
C-17 Aircraft	0.7	4.9	20
Missiles			
Air Defense System, Heavy	a/	0.9	2,724
Non-Line-of-Sight Air Defense System	a/	0.5	n.a.
Small ICBM	a/	5.6	n.a.
Space Defense System	a/	0.9	b/
Ships			
Aircraft Carriers	0.6	2.3	0
SSN-21 Submarine	0.3	4.1	4
Landing Craft, Air Cushion	a/	0.6	24
Other Procurement			
TRI-TAC Equipment	0.2	0.7	n.a.
SINCGARS	a/	0.8	48,500
Total	5.4	32.6	

SOURCE: Congressional Budget Office.

n.a. = not available.

a. Less than $50 million.
b. Number is classified.